EFFECTIVENESS OF ISOMETRIC EXERCISE ON PAIN AMONG PATIENTS WITH OSTEOARTHRITIS AT SELECTED HOSPITALS, SALEM.

By

Reg. No: 301211602

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CERTIFICATE

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but the parent of all the other virtues."

Cicero

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ABSTRACT

An experimental study was done to evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis at selected hospitals, Salem. Quasi experimental pre test post test design was used for this study. The 60 samples were selected through Non Probability Convenience Sampling Technique. Among them 30 patients from London Ortho hospital were selected for experimental group and 30 patients from Sri Gokulam Hospital were selected for control group. The Pre test score of pain were assessed by using numerical pain intensity scale in experimental and control group. The investigator demonstrated isometric exercises for experimental group and instructed to practice it for 21 days. No intervention was given to control group. The Post test was done on the 22nd day by using the same scale.

The findings revealed that 16(53%) patients were in between the age group of 50 to 60 yrs in experimental group and 13(43%) patients were in between the age group of 61 to 70yrs in control group. In experimental group 17 (57%) patients were females and in control group 19(63%) patients were females. During pretest 16(53.3%) patients had severe pain in experimental group and in control group 18(60%) patients had severe pain. During post test 21(70%) patients in experimental group had mild pain and in control group 14(46.7%) patients had moderate pain. In experimental group the pre and post test mean score was 2.63±0.58 and 1.3±0.46 respectively. In control group the pre and post test mean score was 2.8±0.83 and 2.7± 0.69 respectively. The calculated 't' value is 9.04 which is greater than table value 2.01 and it was significant at $p \leq 0.05$ level. Hence the hypothesis (H_1) is retained. Thus it becomes evident that isometric exercise was effective in reducing pain among patients with osteoarthritis. The chi square value of occupation was 15.77 which were greater than table value 12.59 and it was significant at $P \leq 0.05$ level. Hence the research hypothesis H_2 was retained only for occupation in control group. The study concluded that isometric exercise was effective in reducing pain among patients with osteoarthritis.

CHAPTER I

INTRODUCTION

"Those who do not find time for exercise will have to find time for illness"

Earl of Derby

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or in terms of such damage. It is the most common reason for seeking health care. Pain management is considered such an important part of care that it is referred to as **"THE FIFTH VITAL SIGN"** to emphasize its significance and to increase awareness among health care professionals of the importance of effective pain management. **(American Pain Society, 2003)**

The primary clinical manifestation of osteoarthritis is pain, stiffness and functional impairment. Osteoarthritis is known as degenerative joint disease or osteoarthritis is the most common and most frequently disabling of the joint disorders**. (Brunner & Suddharth, 2011)**

Osteoarthritis results in progressive destruction of articular cartilage and bone at the joint margins leading to impairments extending far beyond the synovial joint. A combination of cartilage degradation, bone stiffening and reactive inflammation of the synovium occurs. Understanding of osteoarthritis has been greatly expanded beyond what previously was thought of as simply **"wear and tear"** relating to aging. Arthritis is the most common cause of disability among United States adults. Data from 2007 to 2009 show that one in five or 50 million had arthritis in that period; one in nine or 21 million had osteoarthritis that contributable activity limitation. **(Louise Murphy, 2012)**

The most common arthritis affecting hips and knees, the two joints will focus on here, is known as degenerative arthritis or osteoarthritis. There are many other

forms, but in this case the major distinction is with rheumatoid arthritis, which is an autoimmune disease, not connected with wear and tear or aging. As cartilage wears away, whatever the cause, the bone underlying it degenerates as well. Other parts of the joint ligaments, meniscus (a fibrous band covering part of the knee) and muscles become altered as well. Inflammation brings a burning pain. Eventually the joint becomes stiff and even small movements become painful and difficult**.** (**Deepak Chopra, 2013)**

The first line management of any health problem includes the least invasive interventions. Because osteoarthritis is a chronic and frequently progressive problem, first line treatment is recommended alone or with surgical intervention. Non pharmacological interventions include exercise, rest and joint protection, massage, thermal applications, hydrotherapy, therapeutic touch and physical modalities. Hydrotherapy is performed in water, which promotes muscle relaxation and facilitates movement by making use of water's physical properties adherence and temperature adjustability. Physical modalities use physical energy to achieve therapeutic effects and are employed as adjunctive treatments to prepare for manual therapy, exercise and gait training activities. Physical modalities include a vast array of interventions including thermotherapy, electrotherapy, pressure and light therapy. The physical benefits for older adults of physical activity are well documented**. (Carol L Baird, Maura Daly Iversen, 2012)**

Rehabilitation interventions that target specific impairments and activity restrictions can help restore independence and promote healthy living. Such interventions include exercise, physical modalities, manual techniques (mobilisation and manipulation) and assistive devices. The predominance of evidence on the effects of rehabilitation interventions for knee and hip osteoarthritis suggest that they afford

modest pain relief reduced disability and improved function. Rehabilitation for symptomatic osteoarthritis targets impairment and restriction of activities and may be useful in modifying the risk factors. Exercise is the most studied intervention and appears to provide modest benefits with respect to pain, function and disability**. (Maura Daly Iverson, 2012)**

By identifying arthritis during history taking, health care providers have an opportunity to discuss how physical activity, including exercise, decrease pain, improves function and boosts mood. Self directed low impact activities such as walking, swimming are effective in improving the muscle strength and mobility of joints. **(Charles G. Helmick, 2012)**

Isometric exercise are a type of strength training in which the joint angle and muscle length do not change during contraction (compared to concentric or eccentric contractions, called dynamic/isotonic movements). Isometrics are done in static positions rather than being dynamic through a range of motion. Isometric or static or setting exercise are the exercise in which the joint and muscle are either worked against an immobile force or held in a static position while opposed by resistance. It is a form of exercise involving static contraction of muscle without any visible movement in the angle of the joint. This is reflected in the name , the term isometric combines Greek the prefixes “iso” (same) with ‘metric’ means(distance), meaning that in these exercises the length of the muscle and the angle of the joint do not change , though contraction strength may varied. Mechanical factors such as joint misalignment a role in the development and progression of other risk factors, such as muscle weakness impaired motor control and diminished physical stress are modifiable with exercises. **(Phillips, 2004)**

Need for the Study:

Osteoarthritis also known as degenerative arthritis or degenerative joint disease is a group of mechanical abnormalities involving degradation of joints including articular cartilage and subchondral bone. Symptoms may include joint pain, tenderness, stiffness, locking and sometimes an effusion. A variety of causes for osteoarthritis are hereditary, developmental, metabolic and mechanical deficits may initiate processes leading to loss of cartilage. When bone surfaces become less well protected by cartilage, bone may be exposed and damaged. As a result of decreased movement secondary to pain, regional muscles atrophy and ligaments may become more lax. **(Joyce M Black, 2005)**

Osteoarthritis is the most common form of arthritis and the leading cause of chronic disability in the United States. It affects about 8 million people in the United Kingdom and nearly 27 million people in the United States**.** Exercise is one of the best non pharmacological methods to reduce pain in osteoarthritis. Treatment generally involves a combination of exercise, lifestyle modification, and analgesics. If pain becomes debilitating, joint replacement surgery may be used to improve the quality of life. The treatment programs include ways to manage pain and improving the functioning. These involve strengthening exercises, rest, weight control, pain relief techniques and joint replacement surgeries. **(Charles G. Helmick, 2009)**

The data used by the National Arthritis Data Workgroup (NADW) estimate that in 2005, 27 million United States adults' ages 18 years an older had one or more type of clinical osteoarthritis. The National Arthritis Data Workgroup estimated that in 2005, 9.3 million (4.9%) United States adults ages 26 years and older had symptomatic knee osteoarthritis. Prevalence increases with age and may be higher in

women than in men and in blacks than in whites**. (American Journal of Nursing, 2012)**

The most prevalent ailment affecting Indians is osteoarthritis. While much has been said about the high incidence of diabetes, HIV and cancer in India, a recent study suggests that osteoarthritis beats them all to claim the first spot among ailments in the countries. **(Times of India, 2011)**

Osteoarthritis is the second most common rheumatologic problem and is most frequent joint disease with prevalence of 22% to 39% in India. This is the most common cause of locomotor disability in the elderly. Gastrointestinal toxicity is present in 50% of non steroidal anti inflammatory drug users and 5.4% develop a more serious event requiring hospitalisation due to its frequent use. There use may have a significant impact on overall cost of therapy in patients of Osteoarthritis in spite the fact that non steroidal anti inflammatory drugs are not very costly. Hence, Osteoarthritis represents a major cause of morbidity and disability, as well as a significant economic burden on patients and health care resources. (**Mahajan A et.al, 2005)**

Osteoarthritis and related diseases, is the most prevalent type of arthritis. In the United States, about 27 million people live with the disease. Osteoarthritis is most common among adults over 65 years old but people of any age can develop the disease. Prevalence rises significantly after the of age 50 in men and after the age 40 in women.70 percent of people over the age of 70 have x-ray evidence of osteoarthritis**. (American College of Rheumatology, 2009)**

The centres for disease control and prevention (CDC) and Arthritis Foundation published A National Public Health Agenda for osteoarthritis, a major call to action. It lays out how successfully employing novel approaches to the prevention, early detection, and treatment of osteoarthritis can affect the financial , societal and

personal burden of this chronic disease. Though this ground breaking report placed a spot light on many clinical and advocacy groups, the largest group of health care providers' nurses was notably absent. Nurses have ranked at the top of Gallup's annual **"honesty and ethical standards"** poll for many years and as educators nurses can have great influence on public perception of disease processes and care**. (Laura Robbins, 2012)**

Orthopaedicians and genetics say, obesity is the primary cause and Indians seem to have a genetic predisposition towards osteoarthritis. A crucial causative factor for osteoarthritis, a factor easily remediable is obesity. In India, the most affected joint is the knee. The typical patient is in the 50's, obese to mildly obese, has a sedentary lifestyle. Even after the onset of arthritis, regular knee strengthening exercises will prevent the accumulation of fluid in the joint**. (The Hindu, 2010)**

Osteoarthritis is a chronic condition causing pain, discomfort, impaired functional performance and restricted lifestyle for all the patients. There are so many non pharmacological interventions to reduce the pain and discomfort among these patients. Exercises have a major role in this. Various studies showed that the isometric exercise can reduces the osteoarthritis pain. Hence the researcher felt the importance of providing the isometric exercises to reduce pain among the patients with osteoarthritis.

Statement of the Problem:

A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem.

Objectives:

1. To assess the pain among patients with osteoarthritis in experimental and control group.

2. To evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis in experimental and control group.
3. To associate the pain among patients with osteoarthritis with their selected demographic variables in experimental and control group.

Operational Definition:

Effectiveness:

It is the significant reduction in the pain after performing isometric exercises as measured by numerical pain intensity scale among experimental group.

Isometric exercise:

It is the form of exercise involving static contraction and strengthening of quadriceps muscle performing twice daily for three weeks.

Pain:

It is the unpleasant feelings perceived by patient with knee osteoarthritis which is assessed by numerical pain intensity scale.

Osteoarthritis:

It is a degenerative disorder of the knee joint causing pain, stiffness of the knee and affects the functional performance of the patient.

Assumptions:

1. The patients with osteoarthritis may have some degree of pain on the knee joint.
2. Isometric exercise to the quadriceps muscle may reduce the pain in knee joint.

Hypotheses:

H_1: There will be a significant difference in post test score on pain among patients with osteoarthritis in experimental and control group at $p \leq 0.05$ level.

H_2: There will be a significant association between the pain among patients with osteoarthritis in experimental and control group with their selected demographic variables at $p \leq 0.05$ level.

Delimitations:

1. The study was limited only to the patient with knee osteoarthritis.
2. The data collection period was limited to four weeks.
3. The study was limited to those who are willing to participate in the study.

Conceptual Framework:

Conceptual models are made up of concepts, which are describing mental images of phenomena or prepositions which are statements about concepts. This represents schematic representation of some relationship among phenomena.

Imogene king was proposed a theory which offers insight to nurse's interactions with individuals and groups within the environment. It highlights the importance of client's participation in decision that influences care and focuses on both the process of nurse client interaction and the outcomes of care. The major concepts includes,

Perception:

This involves each person's representation of reality. Researcher perceived the need of isometric exercise in reducing pain among patients with osteoarthritis.

Judgement:

Judgement is the decision made by the researcher and the patients. The researcher decided to do pre-test assessment of pain and decided to demonstrate isometric exercise to the patients with knee osteoarthritis and the patients decided to participate in the study.

Action:

It refers to the changes will be achieved. The researcher action is to demonstrate isometric exercise to the patients with osteoarthritis and patients decide to perform the exercise.

Reaction:

Reaction helps in setting a mutual goal. Here the researcher and patient set a mutual goal. The mutual goal is reduction of pain.

Interaction:

This involves a process of perception and communication. So the researcher identifies the patients with osteoarthritis and maintains good interaction with the patients and encouraged the patients to practice exercise

Transaction:

It is the purposeful interaction leading to goal attainment. The researcher assesses the pain after the intervention using numerical pain intensity scale.

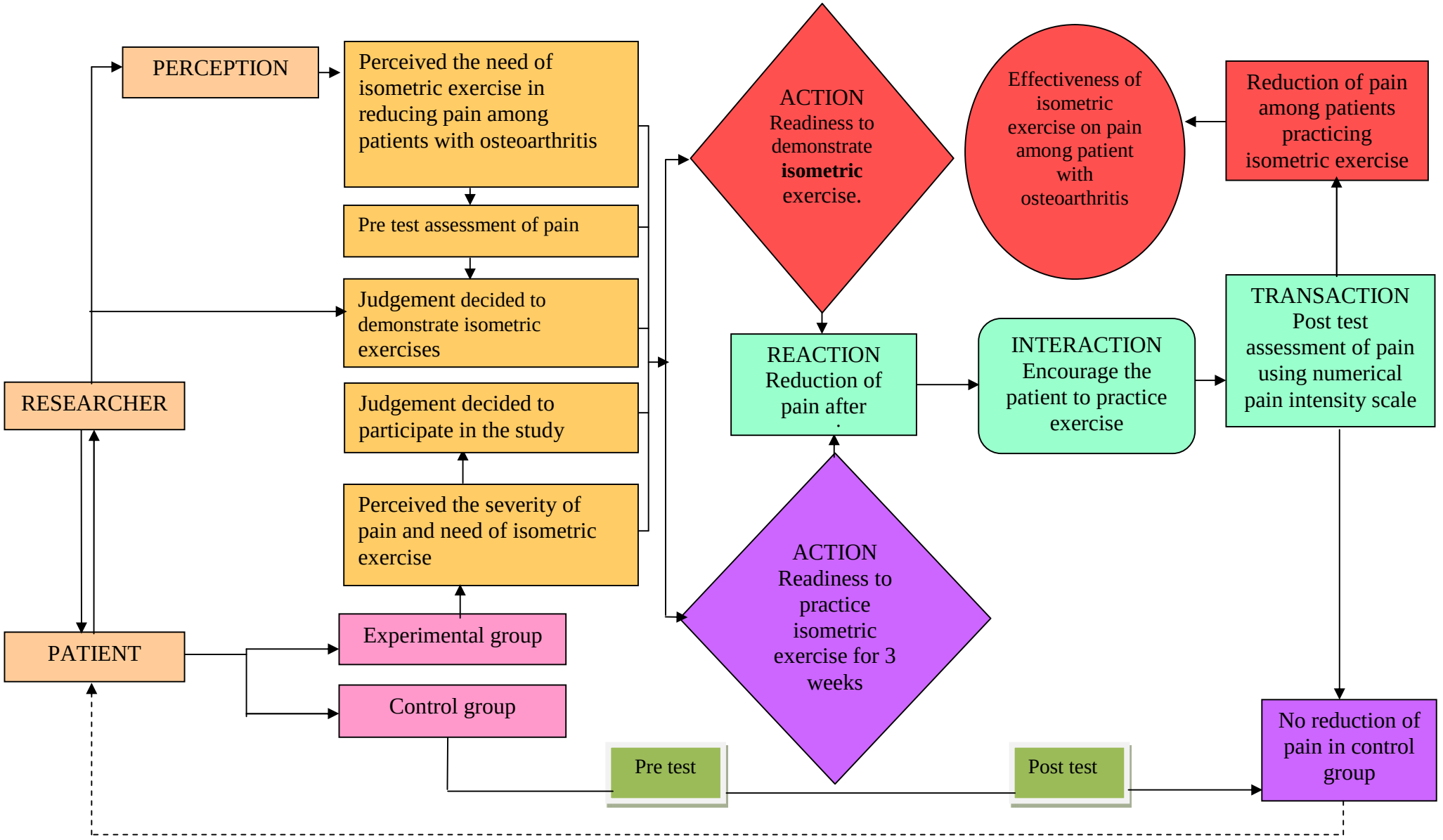

Figure-1.1: Conceptual frame work based on-Imogene King's Goal Attainment Theory (1981) on Effectiveness of Isometric Exercise on Pain among patients with osteoarthritis.

Summary:

This chapter dealt with introduction, need for the study, and statement of the problem, objectives, operational definitions, assumptions, hypothesis, and delimitations, projected out comes, conceptual frame work.

CHAPTER II

REVIEW OF LITERATURE

Review of literature is a critical summary of research on a topic of interest, often prepared to put a research problem in context. **(Denise F. Polit, 2006)**. Review of literature is a very important part of a research study. The review of literature for this study is arranged in following headings:

1. Literature related to osteoarthritis
2. Literature related to effectiveness of isometric exercise on osteoarthritis

1. Literature related to osteoarthritis:

A randomised controlled study was done on the effects of different strength training on muscle architecture in patients with knee osteoarthritis. The study was done at physical medicine and rehabilitation department of Hacettepe University, Turkey. Sixty one patients with knee osteoarthritis were randomly assigned into 6 exercise groups (isometric right/left, isotonic right/left, isokinetic right/left). Subjects were evaluated for pain and functional status with use of the visual analogue pain scale, western Ontario and McMaster universities arthritis index, 50 step walking and single leg stance tests before and after 15 sessions of physical therapy. They concluded that isometric quadriceps training resulted in bilateral strengthening and that accompanying increase in muscle thickness and fascicle length in the same group was consistent with the strength improvement. **(Malas FU, Kaymak B, 2013)**

A randomised controlled study was done on an integrated exercise and pain coping skills training intervention for individuals with knee osteoarthritis. A 12 weeks intervention including 10 physiotherapy visits together with home practice. Participants with symptomatic and radiographic knee osteoarthritis were recruited from the community in two cities in Australia and randomised in to three groups:

exercise alone, psychologists delivered pain coping skill training (PCST) alone, or integrated pain coping skill training (PCST) and exercise. Primary outcomes are overall average pain in past week measured by visual analogue Scale and physical function measured by Western Ontario and McMaster universities (WOMAC) osteoarthritis index subscale. The study concluded that an integrated pain coping skill training and exercise program is effective in the management of painful and functionally limiting knee osteoarthritis compared to either program alone. **(Yasmin Ahamed, Michael A Hunt, 2012)**

A randomised controlled trial was done for the comparison of neuromuscular and quadriceps strengthening exercise in the treatment of various mal aligned knees with medical osteoarthritis. 100 people with medical knee pain, radiographic medical compartment osteoarthritis and varus malalignment were recruited and randomly allocated to one of two 12 weeks exercise program, quadriceps strengthening or neuromuscular exercise. The study concluded that neuromuscular exercise is superior to regarding effects on knee load, pain and physical function in people with medical knee osteoarthritis and varus malalignment. (**Kim. L. Bennell, Paul .W. Hodges, 2011)**

A randomized clinical trial was done on the effects of tai chi exercise on pain, balance, muscle strength and perceived difficulties in physical functioning in older women with osteoarthritis. Twelve forms of Sun-style tai chi exercise have been developed specifically to reduce the symptoms and improve the physical functioning of arthritis patients and this randomized study examined the changes in symptoms and physical characteristics in older women with osteoarthritis at the completion of a 12-week tai chi exercise program. Seventy-two patients with osteoarthritis were randomly assigned into 2 groups. They concluded that older women with

osteoarthritis were able to safely perform the 12 forms of Sun-style Tai physical functioning. **(Rhayun Song, Paul Lam, 2003)**

A study was done in Nottingham on home based exercise programme for knee pain and knee osteoarthritis to determine whether a home based exercise programme can improve outcomes in patients with knee pain. 786 men and women aged above 45yrs were selected. Participants were randomised to four groups to receive exercise therapy, monthly telephone contact, exercise therapy plus telephone contact, or no intervention. At 24 months, highly significant reductions in knee pain were apparent for the pooled exercise groups compared with the non-exercise groups. Similar improvements were observed at 6, 12, and 18 months. Regular telephone contact alone did not reduce pain. The study concluded that simple home based exercise programme can significantly reduce knee pain. **(K.S Thomas, A.C Jones, 2003)**

2. Literature related to isometric exercise on osteoarthritis:

A Double-blind, randomized controlled trial was done on the effectiveness of a manual therapy and exercise protocol in patients with thumb carpo metacarpal osteoarthritis. Sixty patients, 90% female (mean ± SD age, 82 ± 6 years), with Carpo metacarpal joint osteoarthritis were randomly assigned to receive a multimodal manual treatment approach that included joint mobilization, neural mobilization, and exercise for 12 sessions over 4 weeks. All outcome measures were collected at baseline, immediately following the intervention, variable and time as the within-subject variable and at 1 and 2 months following the end of the intervention. This clinical trial provides evidence that a combination of joint mobilization, neural mobilization, and exercise is more beneficial in treating pain than a sham intervention in patients with Carpo Metacarpal joint osteoarthritis. **(Villafañe JH, Cleland JA, 2010)**

A study was done on the effect of baseline quadriceps activation on changes in quadriceps strength after exercise therapy in subjects with knee osteoarthritis. A total of 111 subjects with knee Osteoarthritis (70 ♀) participated in the study. Subjects underwent a 6 week supervised exercise program designed to improve strength, range of motion, balance and physical function. On completion of the exercise program, quadriceps strength and quadriceps activation were re-assessed. Multiple regression analysis was used to determine whether baseline quadriceps activation predicted quadriceps strength scores at the 2 month follow-up period. They concluded that baseline Quadriceps activation did not predict changes in quadriceps strength following exercise therapy. Investigation of other factors that may affect response to exercise therapy is warranted. **(Kristen A. Scopaz, 2009)**

A study was done to investigate the therapeutic effects of different muscle-strengthening exercises on the functional status of patients with knee osteoarthritis. One hundred thirty-two patients with bilateral knee osteoarthritis (Altman Grade II) were sequentially divided into 4 random groups. The patients in group I received isokinetic muscle-strengthening exercise, group II received isotonic muscle-strengthening exercise, group III received isometric muscle-strengthening exercise, and group IV acted as controls. The results showed that the patients with osteoarthritis in each treated group had significant improvement in pain reduction, disability reduction, and in walking speed after treatment and at follow-up when compared with their initial status. They concluded that Isotonic exercise is suggested for initial strengthening in patients with Osteoarthritis with exercise knee pain, and isokinetic exercise is suggested for improving joint stability or walking endurance at a later time. **(Huang Mao Hsiungs, Lee Chia Ling, 2008)**

A systematic review was done on the efficacy of aerobic walking and home based quadriceps strengthening exercises in patients with knee osteoarthritis. Outcome data were abstracted for pain and self reported disability and the effect size calculated for each outcome. Randomised controlled trials were grouped according to exercise mode and the data pooled using both fixed and random effects models. 35 randomised controlled trials were identified, 13 of which met inclusion criteria and provided data suitable for further analysis. Pooled effect sizes for pain were 0.52 for aerobic walking and 0.39 for quadriceps strengthening. The study concluded that both aerobic walking and home based quadriceps strengthening exercise reduce pain and disability from knee osteoarthritis but no difference between them was found on indirect comparison. **(E Roddy, W Zhang, 2004)**

A randomised clinical trial was done on the effect of dynamic versus isometric resistance training on pain and functioning among adults with osteoarthritis of the knee. A total of 102 volunteer subjects with osteoarthritis of the knee randomized to isometric (n=32) and dynamic (n=35) resistance training groups or a control (n=35). Strength exercises for the legs, 3 times weekly for 16 weeks. Knee pain was assessed immediately after each functional task. The Western Ontario and McMaster Universities Osteoarthritis Index was used to assess perceived pain, stiffness, and functional ability. The study concluded that Dynamic or isometric resistance training improves functional ability and reduces knee joint pain of patients with knee osteoarthritis. **(Robert Topps, Sandra Woolley, 2003)**

Summary:

This chapter dealt with review of literature related to osteoarthritis and effectiveness of isometric exercise on osteoarthritis.

CHAPTER III

METHODOLOGY

The methodology of research indicates general pattern of organizing the procedure for gathering valid and reliable data for the purpose of investigation. **(Polit D.F Hungler)**

This study aims to assess the effectiveness of isometric exercise on pain among patients with osteoarthritis at selected hospitals, Salem. This chapter includes research design, description of setting, variables, population, sample, sampling technique, sample size, criteria for sample selection, description of tool, validity, reliability, pilot study, data collection procedure and data analysis method.

Research Approach:

Quantitative evaluative research approach was adopted for this study.

Research Design:

The research design chosen for this study was Quasi Experimental pre test post test control group design. The design can be represented as,

E = O_1 X O_2
C = O_1 O_2

E: Experimental group includes patients with osteoarthritis in selected hospital.

X: Isometric exercise

C: Control group receiving no treatment

O_1: Pre test assessment of pain with numerical pain intensity scale.

O_2: Post test assessment of pain with numerical pain intensity scale

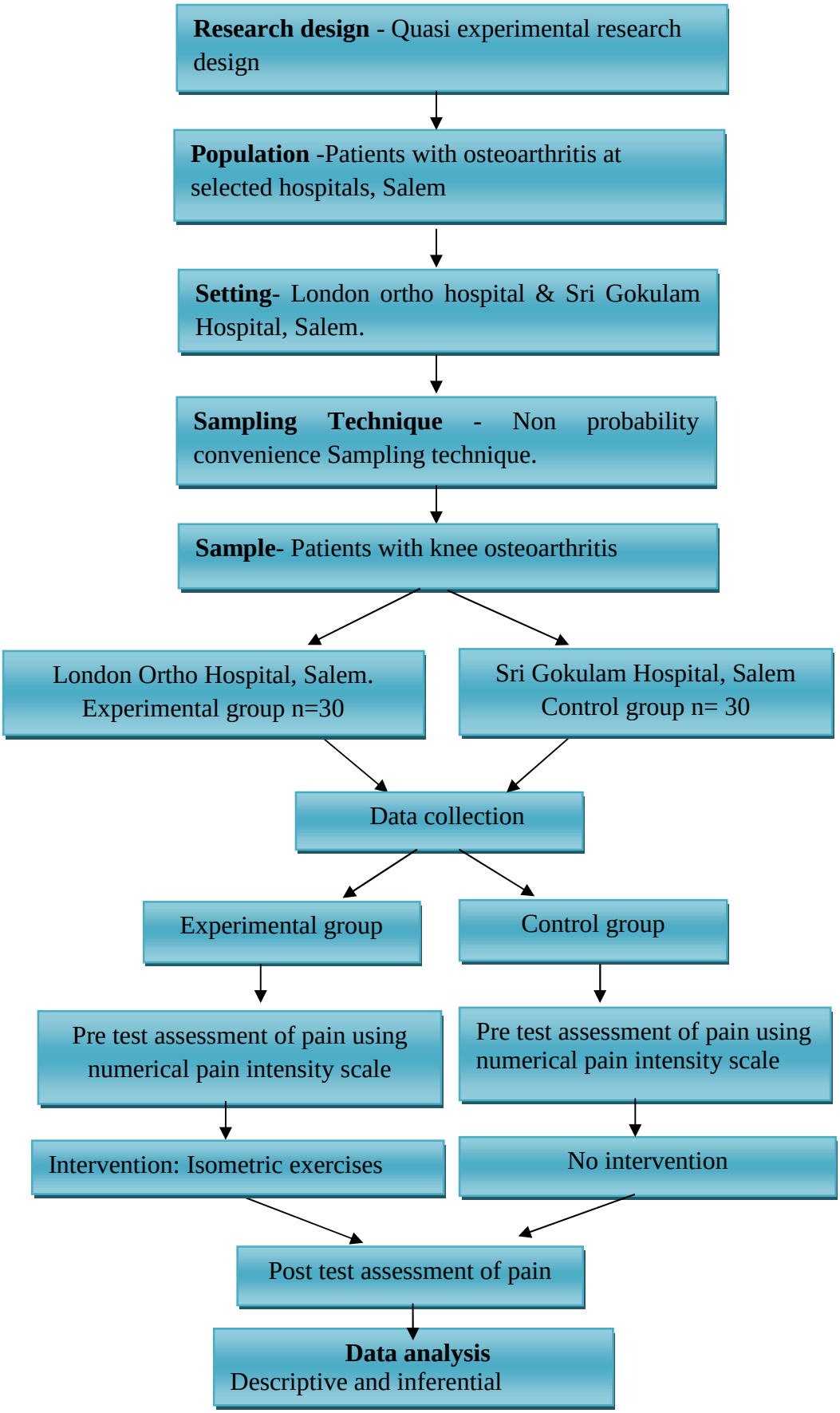

Fig – 3.1: Schematic representation of Research Methodology

Population:

The population of this study includes the patients with osteoarthritis at selected hospitals, Salem.

Description of Setting:

The investigator selected London Ortho Hospital and Sri Gokulam Hospital to conduct this study. Both hospitals were run under private organization. The investigator selected London ortho Hospital as experimental group. The bed strength of hospital was 150. The hospital was well known for various surgical procedures like, Orthoplasty, total knee replacement and various other procedures. It was 15 km away from the Sri Gokulam College of Nursing, located near Anna Park, Salem. The total number of osteoarthritis patients attending outpatient department per day was approximately 20-30. Whereas for control group the investigator selected Sri Gokulam Hospital. It was a 350 bedded hospital situated in the middle of the city which was 8 Km from Sri Gokulam College of nursing. The total number of patients attending outpatient department per day was 10 to 15. The investigator selected the settings based on the availability of the samples and for the feasibility of the study.

Sampling:

Sample:

Sample of this study includes patients with knee osteoarthritis attending Orthopaedic outpatient department and those who fulfil the inclusion criteria and present at the time of data collection at selected hospitals.

Sample size:

Sample size of the study includes 60 patients with knee osteoarthritis. Among them 30 patients were selected for the experimental group and 30 patients were selected for control group.

Sampling Technique:

Non probability convenience sampling technique was adopted for selecting samples for the study.

The setting was selected through non probability convenience sampling technique because of the availability of samples, economy of time, money access and feasibility of the study.

Criteria for sample selection:

Inclusion criteria:

Patient who are,

- Willing to participate in the study
- With knee osteoarthritis
- In the age group of 50 to 80 years

Exclusion criteria:

Patients who are,

- Undergone knee replacement surgery.
- With fracture of the knee

Variables:

Independent variable: Isometric exercises

Dependent variable: Pain

Other variables: Age, Gender, education, occupation, monthly income, diet, duration of illness and previous history of treatment.

Description of Tool:

The tool was prepared by the investigator after an extensive study of the related literature and with the guidance of experts. The tool consists of,

Section A: Demographic data

Structured interview schedule was used to collect demographic data. This section consists of demographic variables such as age in years, sex, education, occupation, monthly income, diet, duration of illness and previous history of treatment.

Section B: Numerical Pain Intensity Scale to assess the pain

The Numerical Pain Intensity Scale was used to assess the pain and the scoring was done according to the severity of the pain.

Table 3.1: Scoring procedure for assessing pain.

Level of pain	**Score**
No pain	0
Mild pain	1 -3
Moderate pain	4-6
Severe pain	7-9
Worst pain	10

Validity and Reliability:

Validity:

Validity of the tool was established by the consultation with guides and experts. The tool was validated by five experts in the field of nursing and one from the field of medicine. The tool was found adequate and suggestions given by the experts were incorporated.

Reliability:

The reliability of the tool was checked and established by using inter rater method and the reliability value was r = 1 which showed that the tool was reliable and considered for proceeding.

Pilot Study:

Pilot study was conducted from 22. 7. 13 to 27. 7. 13. A formal permission was obtained from the managing director of London Ortho Hospital and from the managing director of Sri Gokulam Hospital. The pilot study was conducted with a sample size of 6 patients with knee osteoarthritis. In this 3 patients from London ortho hospital were selected for experimental group and 3 patients from Sri Gokulam hospital were selected for control group. Isometric exercise was demonstrated to the patients in the experimental group and instructed to continue for 5 days and pain assessed on 6^{th} day using numerical pain intensity scale. The data collected were analysed by using descriptive and inferential statistics. The pilot study shows that the tool was feasible and practicable for conducting the research.

Method of Data Collection:

Ethical Consideration:

Prior to the data collection written permission was obtained from the managing directors of London Ortho hospital and Sri Gokulam hospital, Salem.

Data Collection Procedure:

The data was collected from 28.7.13 to 27. 8.13. The patients who fulfilled the inclusion criteria were selected from the hospital by non probability convenience sampling technique. Out of 60 patients, 30 patients from London Ortho Hospital were selected for experimental group and 30 patients from Sri Gokulam Hospital were selected for control group. Their general information was collected by structured interview schedule. The pre test was done using numerical pain intensity scale to assess the pain in both experimental and control group. The isometric exercise was demonstrated to the experimental group and asked to continue for twice daily for 21 days. The investigator has done the follow up through phone calls and given a diary for the patients to maintain it. The pain was assessed on the 22^{nd} day by using

numerical pain intensity scale. The post test was done in control group without intervention by using the same scale.

Plan for Data Analysis:

Data will be analyzed using descriptive and inferential statistics. Descriptive statistics were used to assess the pain and inferential statistics were used to evaluate the effectiveness of isometric exercise on pain. The association between the pain and the selected demographic variables were assessed by chi-square test.

Summary:

This chapter dealt with research approach, research design, population, description of the setting, sampling, variables and description of the tool, validity and reliability, pilot study, method of data collection, and plan for data analysis.

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of collected data to evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis. The collected data was tabulated, organised and analysed by using inferential and descriptive statistics.

Section - A:

Distribution of patients according to their demographic variables.

Section - B:

Distribution of patients according to their pre test score on pain in experimental and control group.

Section –C:

a) Distribution of patients according to their post test score on pain in experimental and control group.
b) Comparison of pre test and post test score on pain among patients in experimental and control group.
c) Comparison of mean, standard deviation, mean percentage and mean difference on pain among patients in experimental and control group.

Section-D: Hypothesis testing

a) Effectiveness of isometric exercise on post test score on pain among patients in experimental and control group.
b) Association of pre test score on pain among patients with their selected demographic variables in experimental and control group.

Section - A

Distribution of patients according to their demographic variables

Table- 4.1

Frequency and percentage distribution of patients according to their personal variables in experimental and control group.

n = 60

S. No	Personal variables	Experimental group n=30		Control group n=30	
		f	%	f	%
1	**Age in years**				
	a) 50 – 60	16	53	9	30
	b) 61 – 70	10	33	13	43
	c) 71 – 80	4	14	8	27
2	**Sex**				
	a) Male	13	43	11	37
	b) Female	17	57	19	63
3	**Education**				
	a) No formal education	5	16.7	7	23.3
	b) Primary	5	16.6	5	16.7
	c) Secondary	6	20	11	36.7
	d) Higher secondary	9	30	3	10
	e) Degree	5	16.7	4	13.3
4	**Occupation**				
	a) Professional	7	23.33	5	16.67
	b) Daily wage	8	26.67	7	23.33
	c) Farmer	1	3.33	3	10
	d) House wife	14	46.67	15	50
5	**Family income per month**				
	a) Below Rs. 5000	5	16.67	5	16.67
	b) Rs. 5000 to Rs. 10000	12	40	14	46.66
	c) Above Rs. 10000	13	43.33	11	36.67
6	**Diet**				
	a) Vegetarian	4	13.33	8	26.67
	b) Non vegetarian	26	86.67	22	73.33

Table 4.1 shows the distribution of patients according to their personal variables in experimental and control group. In experimental group 16(53%) patients and in control group 9(30%) patients are between the age group of 50 to 60 years. In experimental group 10(33%) patients are between the age group of 61 to 70 years whereas in control group 13(43%) patients are between the age group of 61 to 70 years. In experimental group 4(14%) patients and in control group 8 (27%) patients are between the age group of 71 to 80 years. In experimental group 13(43%) patients and in control group 11(37%) patients are males. In experimental group 17(57%) patients are females and in control group 19(63%) patients are females.

In experimental group 5(16.7%) patients and in control group 7 (23.33%) patients have no formal education. In experimental group and control group 5(16.6%) patients have completed primary education. In experimental group 6(20%) patients have completed secondary education whereas in control group 11(36.7%) have completed secondary education. Experimental group shows 9(30%) patients have completed higher secondary education whereas in control group 3(10%) patients have completed higher secondary education. In experimental group 5(16.7%) patients have completed degree whereas in control group 4(13.33%) patients have completed degree.

In experimental group 7(23.33%) patients and in control group 5(16.67%) patients have professional job. In experimental group 8(26.67%) patients and in control group 7(23.33%) patients are daily wages. In experimental group 1(3.33%) patient is a farmer whereas in control group 3(10%) patients are farmers. In experimental group 14(46.67%) patients and in control group 15(50%) patients are house wives.

In experimental group 5(16.67%) patients and in control group 5(16.67%) patients have monthly income of below Rs. 5000. In experimental group 12(40%) patients and in control group 14(46.66%) patients have monthly income of Rs.5000 to Rs. 10,000. In experimental group 13(43.33%) patients have monthly income of above Rs. 10,000 and in control group 11(36.67%) patients have monthly income of above Rs.10,000.

In experimental group 4 (13.33%) patients and in control group 8(26.67%) patients are vegetarians. In experimental group 26(86.67%) patients and in control group 22(73.33%) patients are non vegetarians.

Table- 4.2:

Frequency and percentage distribution of patients according to their health related variables in experimental and control group.

n=60

S.No	Health related variables	Experimental group n=30		Control group n=30	
		f	**%**	**f**	**%**
1	**Duration of illness**				
	a) Below 1 year	3	10	3	10
	b) 1 yr to 2 years	10	33.33	14	46.67
	c) 2 yr to 3 years	8	26.67	10	33.33
	d) 3 yr to 4 years	4	13.33	2	6.67
	e) Above 4 year	5	16.67	1	3.33
2	**Did you take any treatment before; Yes ... or No ... If yes what treatment?**				
	a) Allopathic	30	100	30	100
	b) Homeopathic	-	-	-	-
	c) Ayurvedic	-	-	-	-
	d) Sidda	-	-	-	-

Table 4.2 shows the distribution of patients according to their health related variables. In both experimental and control group 3(10%) patients have duration of illness below one year. In experimental group 10(33.33%) patients and in control group 14(46.67%) patients have duration of illness between 1 year to 2 years. In experimental group 8(26.67%) patients and in control group 10(33.33%) patients have duration of illness between 2 yr to 3 yrs. In experimental group 4(13.33%) patients and in control group 2(6.67%) patients have duration of illness between 3 yr to 4 yr. In experimental group 5(16.67%) patients have duration of illness above 4 yr whereas in control group 1(3.33%) patient has duration of illness of above 4 yr. All the patients in experimental group and control group 30(100%) have taken allopathic treatment.

Section - B

a) Distribution of patients according to their pre test score on pain in experimental group.

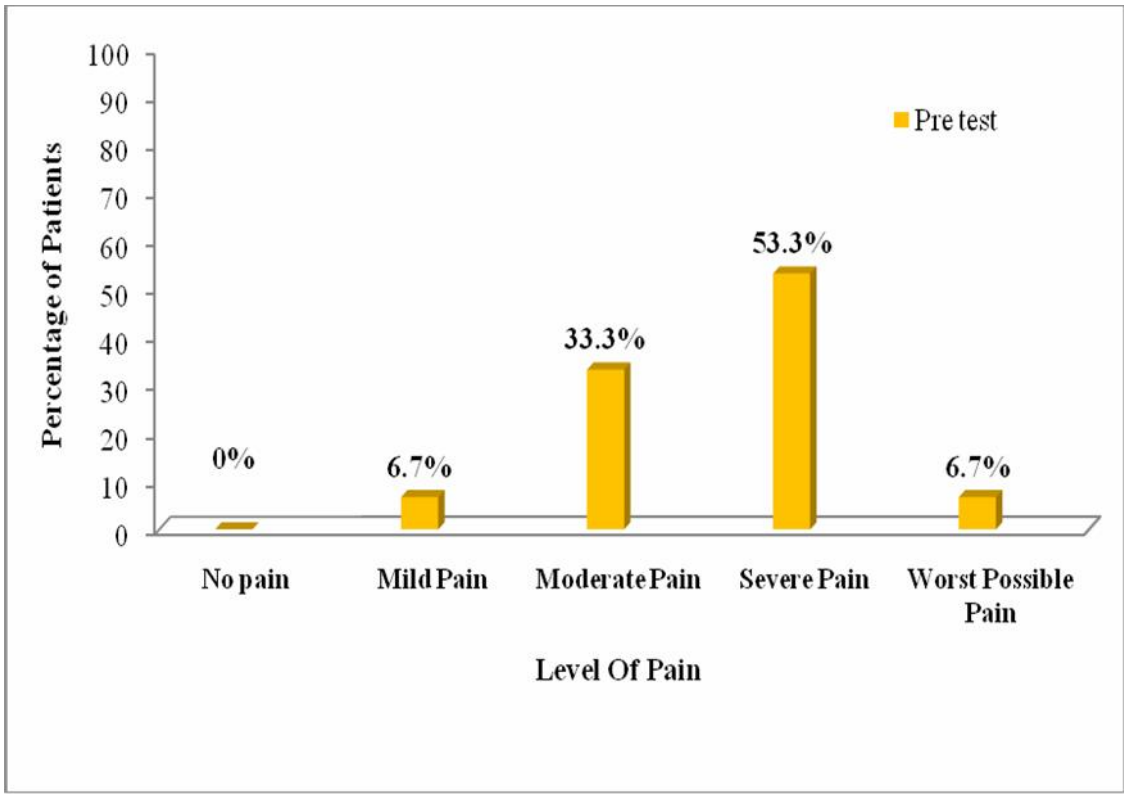

Fig 4.1: Percentage distribution of patients according to their pre test score on pain in experimental group.

The above bar diagram shows that in experimental group none of the patients have no pain, 2(6.7%) patients have mild pain, 10 (33.3%) patients have moderate pain, 16 (53.3%) patients have severe pain and 2 (6.7%) patients have worst possible pain.

b) Distribution of patients according to their pre-test score on pain in control group.

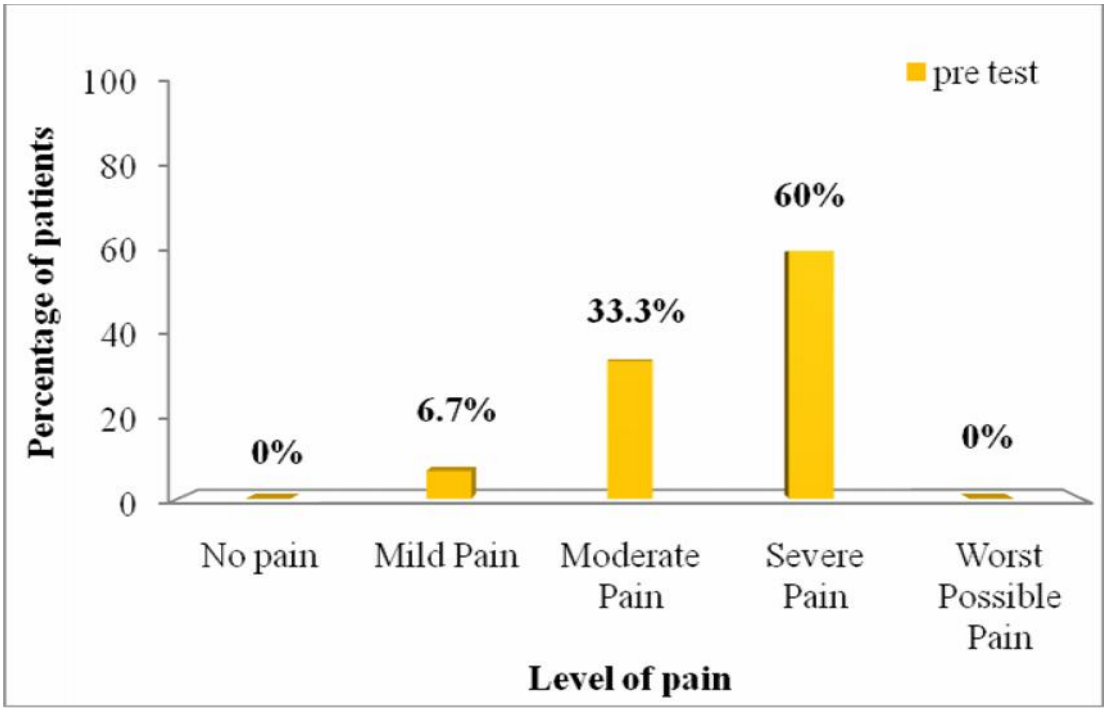

Fig – 4.2: Percentage distribution of patients according to their pre test score on pain in control group.

The above bar diagram shows that in control group none of the patients have no pain and worst possible pain, 2(6.7%) patients have mild pain, 10 (33.33%) patients have moderate pain and 18 (60%) patients have severe pain.

Section- C

a) Distribution of patients according to post test score on pain in experimental group.

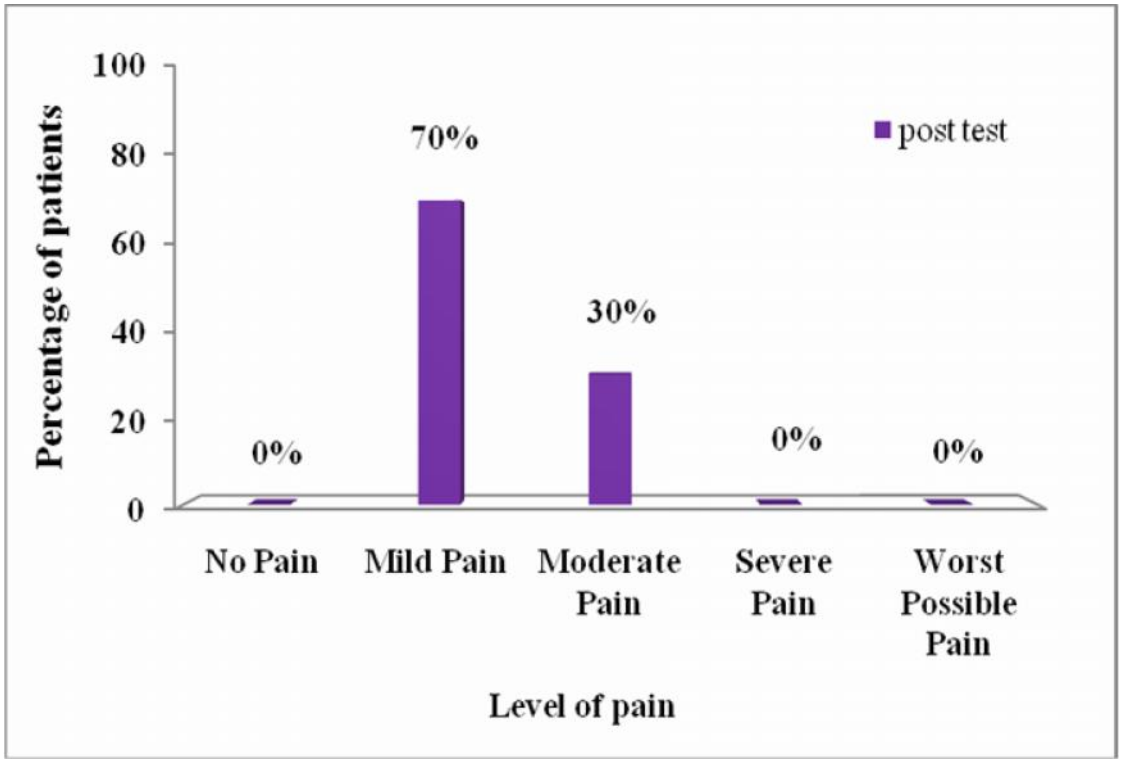

Fig 4.3: Percentage distribution of patients according to post test score on pain in experimental group.

The above bar diagram shows that in experimental group 21 (70%) patients have mild pain, 9(30%) patients have moderate pain, none of the patients have no pain, severe pain and worst possible pain.

b) Distribution of patients according to post test score on pain in control group.

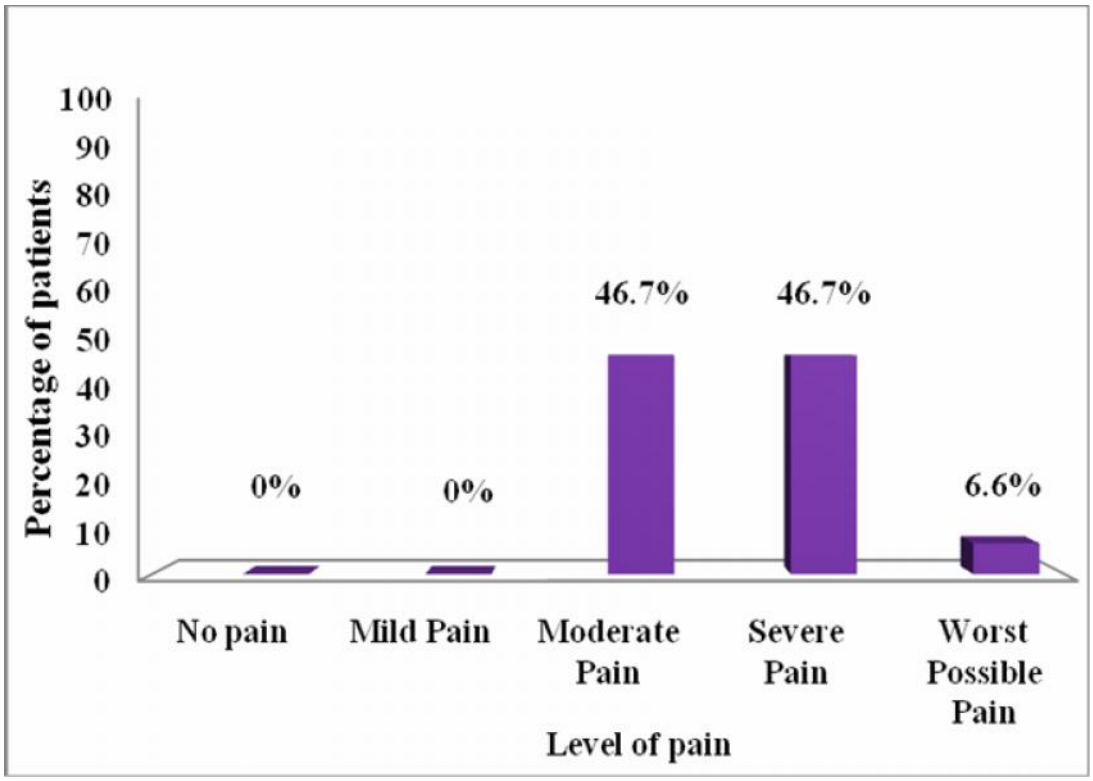

Fig- 4.4: Percentage distribution of patients according to post test score on pain in control group

The above bar diagram shows that in control group 14(46.7%) patients have moderate pain, 14(46.7%) patients have severe pain and 2(6.6%) patients have worst possible pain, none of the patients have no pain and mild pain.

c) Comparison of pre test and post test score on pain among patients in experimental and control group.

Table – 4.3:

Frequency and percentage distribution of patients according to pre test and post test score on pain among patients in experimental and control group.

n = 60

S.No	Pain Score	Experimental Group n = 30				Control Group n = 30			
		Pre test		Post test		Pre test		Post test	
		f	%	f	%	f	%	f	%
1.	No Pain	_	_	_	_	_	_	_	_
2.	Mild Pain	2	6.7	21	70	2	6.7	_	_
3.	Moderate Pain	10	33.3	9	30	10	33.3	14	46.7
4.	Severe Pain	16	53.3	_	_	18	60	14	46.7
5.	Worst Possible Pain	2	6.7	_	_	_	_	2	6.6

The above table 4.3 shows that in experimental group none of the patients have no pain in pre test and post test. In pre test 2(6.7 %) patients have mild pain whereas in post test 21(70%) patients have mild pain. In pre test 10(33.3%) patients have moderate pain whereas in post test 9(30%) patients have moderate pain. In pre test 16(53.3%) patients have severe pain whereas in post test none of them have severe pain. In pre test 2(6.7%) patients have worst possible pain whereas in post test

none of the patients have worst possible pain. There is significant reduction of pain in the experimental group.

In control group none of the patients have no pain in pre test and post test. In pre test 2(6.7%) patients have mild pain where as in post test none of the patients have mild pain. In pre test 10(33.3%) patients have moderate pain whereas in post test 14(46.7%) patients have moderate pain. In pre test 18(60%) patients have severe pain whereas in post test 14(46.7%) patients have severe pain. In pre test none of patient has worst possible pain whereas in post test 2(6.6%) patients have worst possible pain. There is no significant reduction of pain in the control group.

d) Comparison of mean, standard deviation, mean percentage and mean difference on pre test and post test score on pain among patients in experimental and control group.

Table 4.4:

Mean, standard deviation and mean difference on pre test and post test score on pain among patients in experimental and control group.

n=60

Groups	Pre test			Post test			Difference in Mean %
	Mean	SD	Mean %	Mean	SD	Mean %	
Experimental Group	2.63	0.58	26.3	1.3	0.46	13	13.3
Control Group	2.8	0.83	28	2.7	0.69	27	1

The above table 4.4 shows that in experimental group the pre test mean score is 2.63 ± 0.58 and mean percentage is 26.3%, whereas in post test mean score is 1.3 ± 0.46 and mean percentage is 13. The mean difference is 13.3.

In control group the pre test mean score is 2.8 ± 0.83 and the mean percentage is 28, where as in post test the mean score is 2.7 ± 0.69 and mean percentage is 27. The mean difference is 1. Experimental group patients have less pain when compared to the control group. Thus it become evident that isometric exercise reduced the pain among patients in experimental group.

Section D

Hypothesis Testing

a) Effectiveness of isometric exercise on post test score on pain among patients in experimental and control group.

Table 4.5:

Mean, standard deviation, ‘ t’ value on post test score on pain among patients in experimental and control group.

n = 60

Group	Mean	S.D	df	Table value	‘ t’ value
Experimental group	1.3	0.46	58	2.01	9.04*
Control group	2.7	0.69			

*** Significant at p< 0.05 level.**

The above table 4.5 reveals that mean score for experimental group 1.3 ± 0.46 and the mean score for control group 2.7 ± 0.69. The calculated‘t’ value is 9.04 * which is greater than the table value. Hence the research hypothesis H_1 is retained at p≤ 0.05 level. Thus it become evident that isometric exercise is effective in reducing pain among patients with osteoarthritis.

b) Association of pre test score on pain among patients with their selected demographic variables in experimental and control group.

Table- 4.6:

Chi square test on pre test score on pain among patients with their selected demographic variables in experimental and control group.

n = 60

S.No	Demographic variables	Experimental group n =30			Control group n = 30		
		df	χ^2	Table value	df	χ^2	Table value
1	Age in years	6	8.43	12.59	4	1.49	9.49
2	Sex	3	5.06	9.49	2	1.53	5.99
3	Occupation	9	8.176	16.92	6	15.77*	12.59
4	Duration of illness	12	8.20	21.03	8	7.07	15.51

***Significant at p≤0.05 level**

The table 4.6 reveals in experimental group there is no association found between pain and selected demographic variables such as age in years, sex, occupation and duration of illness. Hence research hypothesis H_2 is rejected for these demographic variables at $p \geq 0.05$ level.

In control group there is significant association found between the pain and occupation. Hence the research hypothesis H_2 is retained only for occupation at $p \leq 0.05$ level. There is no association found between pain and selected demographic variables such as age in years, sex, occupation and duration of illness. Hence research hypothesis H_2 is rejected for these demographic variables at $p \geq 0.05$ level.

Summary:

This chapter deals with data analysis and interpretation in the form of statistical value based on the objectives. Distribution of patients according to the frequency and percentage distribution on pain among patients with their selected demographic variables in experimental and control group. The un paired‘t’ test is used to evaluate the effectiveness of isometric exercise on pain among patients. The chi-square test is used to find out the association between the pain among patients with their selected demographic variables such as age in years, sex, occupation and duration of illness. The result shows that isometric exercise is effective in reducing pain among patients in experimental group.

CHAPTER V

DISCUSSION

This study was conducted to evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis at selected hospitals, Salem.

Frequency and percentage distribution of patients in experimental and control group according to their demographic variables.

The distribution of patients according to their demographic variables reveals that half of patients 16(53%) are in between the age group of 50 to 60 in experimental group and 13(43%) patients are in between the age group of 61 to 70 in control group. In experimental group half of patients 17 (57%) are females and in control group 19 (63%) patients are females. In experimental group 9 (30%) have completed higher secondary education and in control group 11 (36.7%) have completed secondary education. In experimental group14 (46.67%) and half of patients in control group 15 (50%) are house wives. In experimental group 13 (43.33%) patients have monthly income of Rs.5000 to 10000 and above Rs.10,000, where as in control group 14 (46. 66%) patients have monthly income of Rs.5000 to 10,000. Majority of patients in experimental group 26(86.67%) and most of patients in control group 22(73.33%) are non vegetarians. In experimental group 10 (33.33%) patients and in control group 14(46.67%) have duration of illness above 1 year to 2 years. All patients in experimental and control group 30(100%) have taken allopathic treatment before.

Assessment of the pain among patients with osteoarthritis in experimental and control group.

During pre test in experimental group, none of the patients have no pain, 2(6.7%) patients have mild pain, 10 (33.3%) patients have moderate pain, 16 (53.3%) patients have severe pain and 2 (6.7%) patients have worst possible pain. Whereas in

control group none of the patients have no pain and worst possible pain, 2(6.7%) patients have mild pain, 10 (33.33%) patients have moderate pain and 18 (60%) patients have severe pain.

This study was supported by **Keith, (2011)** who done a descriptive study on patients with knee osteoarthritis to evaluate the influence of different pain patterns on patients' quality of life. Patients were recruited by convenience sampling technique in a private general practice clinic in Hong Kong. Most patients (80%) described two different types of pain, mechanical and inflammatory pain, each presenting with a different pain quality and onset pattern. Nine patients (45%) self-evaluated their pain score to be <4 and another nine patients (45%) reported a pain score of between 4 and <8. The mean pain score of all 20 patients was 4.725 (standard deviation, 2.16). Osteoarthritis was considered severe in seven patients (35%), moderate in five patients (25%), mild in four patients (20%), and very severe in the remaining four patients (25%).

Effectiveness of isometric exercise on pain among patients with osteoarthritis in experimental group and control group.

Post test reveals that the mean score for experimental group was 1.3±0.46 and the mean for control group was 2.7±0.69, the 't' value is 9.04 which is significant at $p<0.05$ level and hypothesis (H_1) is retained. Thus it becomes evident that isometric exercise was effective in reducing pain.

The present study was supported by **Shakor A Md, (2010)** who conducted a study on the effect of isometric quadriceps muscle strengthening exercise on chronic osteoarthritis of the knee in Bangladesh. A total of 64 patients with knee osteoarthritis were studied to observe the effect of isometric muscle strengthening exercise plus non steroidal anti inflammatory drugs on osteoarthritis of knee joints. Another 75 patients

were treated with non steroidal anti inflammatory drugs as control. They were assessed by visual analogue scale. In comparison between two groups, more improvement was found in exercise group than only non steroidal anti inflammatory drugs group after 4^{th} week (95% Confidence Interval was -10.33 to -1.52). Then it was found that the improvement was gradually increased. Finally, it was found that there was significant improvement in exercise group than only non steroidal anti inflammatory drugs group after 6^{th} week (95% Confidence Interval was -13.29 to -5.2). Regarding range of motion, in comparison between two groups, there was no significance difference in improvement of range of motion in between two group after treatment for six weeks ($p = 0.45$).

Association of the pain among patients with osteoarthritis with their selected demographic variables in experimental and control group.

In control group there was association between the pain and selected demographic variables like occupation. Hence the research hypothesis (H_2) was retained. In experimental group there was no association between pain and selected demographic variables.

The present study was supported by **Williams MC, (2011)** who conducted a study on occupational risk factors for osteoarthritis of the knee in Nottingham. A systematic review of observational studies of osteoarthritis and occupation was done. Relative risk estimated and 95% confidence intervals compared to sedentary work were retrieved. Occupational risks for osteoarthritis were examined in total of 526,343 subjects. Study designs showed a positive association between knee osteoarthritis and occupational activities; cohort (OR 1.38, 95% Confidence Interval 1.10-1.74), cross-sectional (Odds Ratio 1.57, 95% Confidence Interval 1.37-1.81) and case control (Odd Ratio 1.80, 95% Confidence Interval 1.48-2.19). Overall there was evidence of

publication bias (P<0.0001) which was apparent in the cross-sectional and case control studies (P<0.0001 and P=0.0247 respectively). The study designs showed a positive association between knee osteoarthritis and occupational activities.

Summary:

This chapter dealt with discussion of the study with reference to the objective and supportive study.

CHAPTER VI

SUMMARY, CONCUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter consists of four sections. In first two sections, the summary and conclusion are presented. In the last two sessions, the recommendations for further research and implications for nursing practice are presented.

Summary:

The main focus of the study was to evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis. This has been conducted in London Ortho Hospital and Sri Gokulam Hospital, Salem. The patients were selected between the age group of 50 to 80 yrs, patients diagnosed with knee osteoarthritis.

Non probability convenience sampling technique has adopted for the study and sample size was 60. Among this 30 patients were selected for experimental group and 30 patients were selected for control group. Quasi experimental study was used for this study. The general information was collected by structured interview schedule. The base line data was tabulated and analyzed.

The Major Findings of the Study:

- Half of patients 16(53%) were in between the age group of 50 to 60 in experimental group and 13(43%) patients were in between the age group of 61 to 70 in control group.
- In experimental group half of patients 17 (57%) were females and in control group 19 (63%) patients were females.
- In experimental group 9 (30%) had completed higher secondary education and in control group 11 (36.7%) had completed secondary education
- In experimental group14 (46.67%) and half of patients in control group 15 (50%) were house wives.

- In experimental group 13 (43.33%) patients had monthly income of Rs 5000 to 10,000 and above 10,000, where as in control group 14 (46. 66%) patients had monthly income of Rs 5000 to 10,000.
- Majority of patients in experimental group 26(86.67%) and most of patients in control group 22(73.33%) were non vegetarians
- In experimental group 10 (33.33%) patients and in control group 14(46.67%) had duration of illness between 1 year to 2 years.
- All patients in experimental and control group 30(100%) had taken allopathic treatment before.
- In experimental group during pre test 16(53.3%) patients had severe pain and in control group 18(60%) patients had severe pain where as in post test 21(70%) patients had mild pain in experimental group and 14(46.7%) patients had severe pain and moderate pain in control group.
- In experimental group the pre and post test mean score was 2.63±0.58 and 1.3±0.46 respectively. The pre and post test mean percentage was 26.3% and 13%. The mean difference was 13.3 in control group the pre and post test mean score was 2.8 ± 0.83 and 2.7±0.69 respectively. The mean percentage was 28% during pre test and 27% during post test. The mean difference was 1. Experimental group patients had less pain when compared to control group. Thus it became evident that isometric exercise reduced the pain among patients with osteoarthritis.
- In experimental group the post test mean score was 1.3±0.46 and in control group the post test mean score was 2.7±0.69. The calculated‘t’ value is 9.04* which was greater than table value. Hence the research hypothesis H_1 was

retained at p ≤0.05 level. Thus it become evident that isometric exercise was effective in reducing pain among patients.

- In experimental group there was no association found between pain and selected demographic variables. In control group there was significant association found between the pain and occupation. Hence the hypothesis H_2 was retained only for occupation at P≤0.05 level.

Conclusion:

The present study was done to evaluate the effectiveness of isometric exercise on pain among patients with osteoarthritis at selected hospitals, Salem. The findings of the study revealed that isometric exercise was effective on significant reduction of pain among patients with osteoarthritis. There was no significant association between the pain and selected demographic variables in experimental group. In control group there was significant association found between pain and occupation.

Implications:

Nursing Practice:

- Isometric exercise can be practiced in nursing care.
- Nurses can develop knowledge on isometric exercise and its effectiveness on reducing pain.
- Nurses can identify the importance of isometric exercise use as an adjuvant to pharmacological therapy in reducing pain.
- Nurses can demonstrate the isometric exercise and encourage the patients to practice it, those who are suffering from osteoarthritis and other joint disorders.
- Nurses can use isometric exercise to improve the functional performance of the patients with osteoarthritis.

Nursing Education:

- In service education program should be conducted for nurses and help them to gain knowledge regarding isometric exercises.
- Provide exposure to various non pharmacological measures and therapies and update the nursing curriculum.
- Nurse educator can encourage students to make new ideas in managing the pain.
- Periodic continuing education programs can be arranged regarding non pharmacological measures and other therapies to update nursing profession about its importance in reducing pain among patients with osteoarthritis.

Nursing Research:

- Generalisation of the study result can be made by replication of the study.
- Disseminate the findings through conference, seminars, publication in journals and worldwide web.
- Findings of the study can be utilized for conducting further observational studies.
- The findings of the study can help to improve the scientific body of professional knowledge upon which further research can be conducted.

Nursing Administration:

- The nurse administrator can organize and conduct various continuing education programs and in-service education programs on non pharmacological and other therapies for the management of pain.
- The nurse administrator should take initiatives to make protocol of isometric exercises for patients with muscle and joint pain.

- ❖ Educate the public regarding the importance of various non pharmacological measures to relieve pain.

Recommendations:

- ❖ Comparative study can be conducted to evaluate the effectiveness of isometric exercise vs isotonic exercise on pain management.
- ❖ A true experimental study can be done to evaluate the effectiveness of isometric exercise on different orthopaedic problems.
- ❖ A study can be done on the effect of various non pharmacological therapies on osteoarthritis pain.
- ❖ An experimental study can be done on the effect of isometric exercise on functional performance of patients with osteoarthritis.
- ❖ Effectiveness of isometric exercise can be studied on pain reduction after knee replacement surgery

Summary:

This chapter dealt with summary, conclusion, major findings, implications of nursing practice and recommendations.

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- Ezhilarasu, 2013; Effectiveness of mirror box therapy on pain among arthritis patients at selected hospitals, Salem.

- Sajith Chandran, 2011; Effectiveness of isometric exercises on pain perception and functional mobility among old age people with osteoarthritis who are residing in old age homes at Mangalore.

Published Thesis:

- Keith, 2011; A qualitative study on patients with knee osteoarthritis to evaluate the influence of different pain patterns on quality of life, Journal of rheumatology.
- Shakoor A Md, 2010; Effect of isometric quadriceps strengthening exercise on knee osteoarthritis.

ANNEXURE- A

LETTER SEEKING PERMISSION TO CONDUCT A RESEARCH STUDY

From

Geena George,

Final Year, M.Sc (Nursing),

Sri Gokulam College of Nursing,

Salem, Tamil Nadu.

To

The Principal,

Sri Gokulam College of Nursing,

Salem, Tamil Nadu.

Respected Sir/Madam,

Sub: Permission to conduct research project- request –reg

I, **Geena George**, Final Year M.Sc.(Nursing) student of Sri Gokulam College of Nursing, is conducting research project which is to be submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai as partial fulfilment of University requirement for the award of M.Sc.(Nursing) Degree.

Topic: "A Study to evaluate the Effectiveness of isometric exercise on pain among patients with osteoarthritis at Selected Hospitals, Salem."

I wish to seek administrative permission to conduct the research study at London Ortho and Sri Gokulam Hospitals, Salem.

Kindly do the needful.

Thanking you.

Date: 17-07-2013 Yours sincerely,

Place: Salem.

(Geena George)

ANNEXURE-B

LETTER SEEKING PERMISSION TO CONDUCT A RESEARCH STUDY

SRI GOKULAM COLLEGE OF NURSING
3/836, Periyakalam, Neikkarapatti, Salem - 636 010.
Phone : 0427 - 6544550,2272240,2272250 Fax : 0427 - 2270200, 2447077
Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date :

LETTER REQUESTING PERMISSION TO CONDUCT THE RESEARCH STUDY

To
The Managing Director,
Sri Gokulam Hospital,
Salem.
Respected Sir,

Sub: Permission to conduct Research Project – request –reg.

Please be informed that the students of our college are to conduct a Research project, which is to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai, as partial fulfilment of University requirement for the award of M.Sc (Nursing) Degree. The names of the students, the area of study and their statements are as follows:

Sl no:	Name of the student	Department	Area of the study	Topic
1.	Ms.Anfy Maria .A.T	Medical and Surgical Nursing	Ward	A study to assess the effectiveness of video assisted teaching programme on knowledge and attitude regarding cardiac rehabilitation among patients with acute myocardial infarction, at selected hospitals, salem.
2.	Ms.Geena George	Medical and Surgical Nursing	Ortho Out Patient Department physiotherapy department	A study to evaluate the effectiveness of isometric exercise on pain among patient with osteoarthritis at selected hospitals, salem.
3.	Ms.Ligi Rachel Daniel	Medical and Surgical Nursing	ICU	"A Study to Evaluate the Effectiveness of Ventilator Bundle On Ventilator Associated Pnemonia among Mechanically Ventilated Patients At Selected Hospitals,Salem."
4.	Ms.Linsa Baby	Medical and Surgical Nursing.	Ward and ICU	"A Study to Evaluate the Effectiveness of Auditory Stimulation on Motor and Verbal Responses among Patients admitted in Intensive Care Unit with Traumatic Brain Injury at Selected Hospitals, Salem"
5.	Ms.Philsy Philip	Medical and Surgical Nursing	ICU	"A Comparative Study to Evaluate the Effectiveness of Stockings Versus Range of Motion Exercises on Deep Vein Thrombosis Among ICU Patients at Selected Hospitals,Salem".
6.	Ms.Ninu Paulose	Paediatric Nursing	Paediatric Ward and Paediatric Out Patient Department.	"A study to assess the Effectiveness of Play Therapy on Level of Anxiety among Children (1-5 years of age) undergoing Nebulization at selected hospitals, Salem."

SRI GOKULAM COLLEGE OF NURSING

3/836, Periyakalam, Neikkarapatti, Salem - 636 010.

Phone : 0427 - 6544550.2272240.2272250 Fax : 0427 - 2270200. 2447077

Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date : .....

7.	Ms.B.Manjula	Obstetrics and Gynaecological Nursing.	ICU and Ward	"A Study to Evaluate the Effectiveness of Hand and Foot Massage on Pain among Post Caesarean Mothers at Selected Hospitals, Salem."
8.	Ms.A.Sahaya Vivitha	Mental Health Nursing	Ward and Psychiatric Out Patient Department.	"A study to Evaluate the Effectiveness of Structured Teaching Programme on Knowledge regarding Expressed Emotions in Relapse Prevention among Caregivers of Patients with Schizophrenia in a Selected Hospital ,Salem."

I request you to kindly permit them to conduct the above mentioned Research Project in our Hospital from 29-07-13 to 27-08-13 .they will adhere to the policies and regulations of the Hospital.

Thanking You,

Date :17-07-13
Place : Salem

Yours Sincerely,

(Dr.K.Tamizharasi)

18/7/13

SRI GOKULAM COLLEGE OF NURSING
3/836, Periyakalam, Neikkarapatti, Salem - 636 010.
Phone : 0427 - 6544550,2272240,2272250 Fax : 0427 - 2270200, 2447077
Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date : .....

LETTER SEEKING PERMISSION TO CONDUCT A RESEARCH STUDY

To,

The General Manager,

London Ortho Hospital,

Salem.

Respected Sir / Madam,

Sub: Permission to conduct research project- request - reg.

This is to introduce **Ms.GEENA GEORGE** Final Year M.Sc(Nursing) student of Sri Gokulam College of Nursing. She is to conduct a research project which is to be submitted to the Tamilnadu Dr.M.G.R.Medical university,Chennai in partial fullfillment for the award of M.Sc. (Nursing) Degree.

Topic: "A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at Selected Hospitals, Salem."

I request you to kindly permit her to conduct a research project in your esteemed Hospital. She will adhere to the Hospital policies and regulations.

Thanking you.

Yours Sincerely,

Date: 17.07.2013

Place: Salem

(Dr.K.Tamizharasi)
PRINCIPAL
Sri Gokulam College of Nursing
SALEM – 636 010.

Permitted to conduct the study @ London Ortho Hospital

DR. C. SUGAVANAM,
M.S.(Ortho) D.Ortho., M.S.(Ortho) Edinburgh, FRCS Ortho (London)
CONSULTANT ORTHOPAEDIC SURGEON
Reg No. 43008

SRI GOKULAM COLLEGE OF NURSING
3/836, Periyakalam, Neikkarapatti, Salem - 636 010.
Phone : 0427 - 6544550,2272240,2272250 Fax : 0427 - 2270200, 2447077
Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date : .....

LETTER SEEKING PERMISSION TO CONDUCT PILOT STUDY

To,

The General Manager,

London Ortho Hospital,

Salem.

Respected Sir / Madam,

Sub: Permission to conduct pilot study- request - reg.

This is to introduce **Ms.GEENA GEORGE** Final Year M.Sc. (Nursing) student of Sri Gokulam College of Nursing. She is to conduct a research project which is to be submitted to the Tamilnadu Dr.M.G.R.Medical university,Chennai in partial fullfillment for the award of M.Sc. (Nursing) Degree.

Topic: "A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at Selected Hospitals, Salem."

I request you to kindly permit her to conduct a pilot study in your esteemed Hospital. She will adhere to the Hospital policies and regulations.

Thanking you.

Date: 17.07.2013

Place: Salem

Permitted

DR. C. SUGAVANAM,
M.S (Ortho) Dip. NB (Ortho) MNAMS, FRCS Ortho (London)
CONSULTANT ORTHOPAEDIC SURGEON
Reg No. 43008

Yours Sincerely,

(Dr.K.Tamizharasi)
PRINCIPAL
Sri Gokulam College of Nursing
SALEM – 636 010.

ANNEXURE-C

LETTER SEEKING PERMISSION TO CONDUCT A RESEARCH STUDY

From

Ms.Geena George,
Final Year M.Sc., (N)
Sri Gokulam College of Nursing,
Salem, Tamil Nadu.

To,

(Through proper channel)

Respected Sir/ Madam,

Sub: Requesting opinion and suggestions of experts for establishing content validity of the tool.

I **Ms. Geena George,** II Year M.Sc., (Nursing) student of Sri Gokulam College of Nursing, Salem, have selected the below mentioned Statement of the Problem for the research study to be submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai as partial fulfillment for the award of Master of science in Nursing.

Topic: "A Study to evaluate the Effectiveness of isometric exercise on pain among patients with osteoarthritis at Selected Hospitals, Salem."

I request you to kindly validate the tool developed for the study and give your expert opinion and suggestion for necessary modifications.

Thanking you,

Place : Salem
Yours sincerely,

Date :

Ms. Geena George

Enclosed:

1. Certificate of validation
2. Criteria checklist of evaluation of tool
3. Tool for collection of data
4. Intervention

ANNEXURE- D

TOOL

Section A: Demographic Data

Instructions:

The researcher ask questions and putting the (✓) mark.

Sample No:

1. Age in years
    a. 50 – 60 ( )
    b. 61 – 70 ( )
    c. 71 – 80 ( )
2. Sex
    a. Male ( )
    b. Female ( )
3. Education
    a. No formal education ( )
    b. Primary ( )
    c. Secondary ( )
    d. Higher secondary ( )
    e. Degree ( )
4. Occupation
    a. Professional ( )
    b. Daily wage ( )
    c. Farmer ( )
    d. House wife ( )

5. Family income per month

    a. Below Rs. 5000 ( )

    b. Rs. 5000 to Rs. 10000 ( )

    c. Above Rs. 10000 ( )

6. Diet

    a. Vegetarian ( )

    b. Non vegetarian ( )

7. Duration of illness

    a. below 1 year ( )

    b. 1 year to 2 years ( )

    c. 2 years to 3 years ( )

    d. 3 years to 4 years ( )

    e. Above 4 years ( )

8. Did you take any treatment before?

    a. Yes ( )

    b. No ( )

If yes what treatment?

    a. Allopathic ( )

    b. Homeopathic ( )

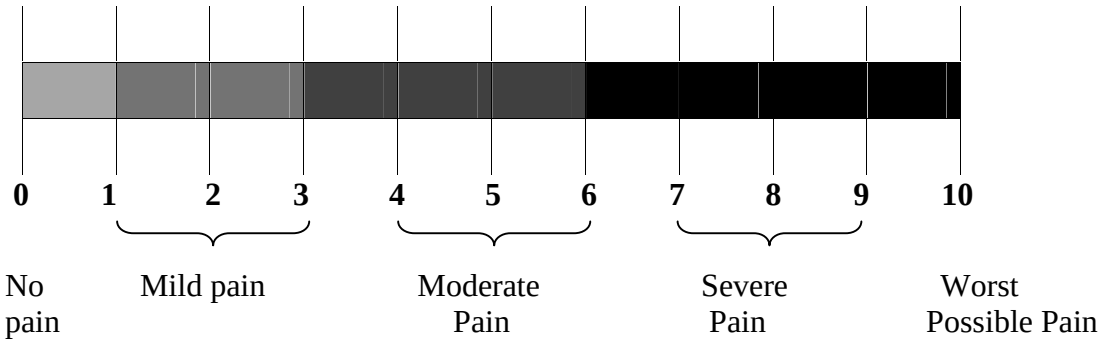
    c. Ayurvedic ( )

    d. Siddha ( )

SECTION-B

Numerical Pain Intensity Scale to assess the level of osteoarthritis pain.

0 – 10 Numerical Pain Intensity Scale (American Pain Society)



This scale helps to assign a number from zero to ten according to the severity of their pain. The total pain score is interpreted as,

0 = No pain

1 – 3 = Mild pain

4 – 6 = Moderate pain

7 – 9 = Severe pain

10 = Worst possible pain

INTERVENTION

Isometric Exercise

Isometric exercise or isometrics are a type of strength training in which the joint angle and muscle length do not change during contraction. Isometric exercise is a form of exercise involving the static contraction of a muscle without any visible movement in the angle of the joint.

Purpose

- To strengthen the muscles
- To reduce the pain
- To improve the functional performance

Types of Exercises

1. Quad Set In Light Flexion

Procedure

- Place the patient in a supine position in a bed
- Place rolled towel under the knees
- Turn the leg out and tighten the thighs.
- Hold it for ten seconds and relax.
- Repeat for 10 times for each leg.

2. Isometric straight leg exercise

- Stretch out on the floor in a supine position.
- Legs should be extended straight out
- Toes should be pointing to the ceiling (flexed feet).
- Beginning with right leg, lift the leg to a position 2 to 3 inches above the floor.
- Hold for 8 to 10 seconds, and release .Repeat 10 times for each leg.

3. Isometric sitting knee exercise

Procedure

1. Place the patient in sitting position with spine straight
2. Ask the patient to extend the knee parallel to the floor
3. Hold it for ten seconds and then flex the knee as normal.
4. Repeat 10 times for each leg.

4. Static quadriceps:

Procedure

1. Ask the patient stand straight with legs apart
2. Ask to tight the knee and hold it for 5 to 6 sec and relax
3. Repeat 10 times for each leg.

கருவி எண் - 1

தனிநபர் விபரம்

குறிப்பு:

கீழே கொடுக்கப்பட்டுள்ள கேள்விகளுக்கு ஆய்வுக்குட்பட்ட நபர் கூறும் சரியான பதிலை ஆய்வாளர் (✓) குறியீடு மூலம் குறிப்பிடுதல்.

எண்: **தேதி:**

1. வயது

அ) 50 - 60

ஆ) 61 - 70

இ) 71 - 80

2. பாலினம்

அ) ஆண்

ஆ) பெண்

3. கல்வித்தகுதி

அ) படிப்பறிவில்லாதவர்

ஆ) தொடக்கக்கல்வி

இ) உயர்நிலைக்கல்வி

ஈ) மேல்நிலைக்கல்வி

உ) முதுகலைப்படிப்பு

4. தொழில்

அ) கல்விச் சார்ந்த வேலை

ஆ) தினக்கூலி

இ) விவசாயம்

ஈ) இல்லத்தரசி

5. குடும்பத்தின் மாத வருமானம்

அ) ரூ.5000க்கு கீழ்

ஆ) ரூ.5001- ரூ.10000 வரை

இ) ரூ.10000க்கு மேல்

6. உணவு முறை

அ) சைவம்

ஆ) அசைவம்

7. உடல்நலக்குறைவு ஏற்பட்ட காலம்

அ) ஒரு ஆண்டிற்கு குறைவாக

ஆ) 1 முதல் 2 ஆண்டுகள்

இ) 2 முதல் 3 ஆண்டுகள்

ஈ) 3 முதல் 4 ஆண்டுகள்

உ) 4 ஆண்டிற்கு மேல்

8. இதற்கு முன்பு இந்நோயிற்கான சிகிச்சை எடுத்துக் கொண்டீர்களா?

அ) ஆம்

ஆ) இல்லை

ஆம் என்றால், எந்த வகையான சிகிச்சை எடுத்துக்கொண்டீர்கள் .....

அ) அலோபதி

ஆ) ஆயுர்வேதா

இ) சித்த மருத்துவம்

ஈ) ஹோமியோபதி

ஐசோமெட்ரிக் உடற்பயிற்சி

ஐசோமெட்ரிக் உடற்பயிற்சி அல்லது ஐசோமெட்ரிக் ஆகியவை ஒருவகை வலிமை பயிற்சியாகும். இதில் தசை சுருங்கும் எலும்புகள் சேருமிடம் மற்றும் தசையின் அளவில் எந்த மாற்றமும் ஏற்படாது. ஐசோமெட்ரிக் உடற்பயிற்சி என்பது ஒரு வகையான உடற்பயிற்சி இதில் தசைகள் சுருங்கும்போது எலும்புகள் சேரும் இடத்தில் எந்தவித அசைவும் இருக்காது.

பயன்பாடுகள்

- தசைகளை பலப்படுத்துதல்
- வலியினை குறைக்க
- உடற்பயிற்சி முன்னேற்றம் செய்யவேண்டும்

உடற்பயிற்சியின் வகைகள்

1. முடிந்த அளவிற்கு முட்டியை மடக்கவும்

- நோயாளியை படுக்கையில் படுக்க வைக்கவும்.
- சுருட்டிய துண்டை முட்டியின் அடியில் வைக்கவும்.
- முட்டிகளை சுருட்டி வைத்த துண்டிற்கு எதிராக அழுத்தவும், பின் தளர்த்தவும்.
- இதுப்போல் பத்து முறை பண்ணவும்.

2. ஐசோமெட்ரிக் கால்களை நேராக்கும் உடற்பயிற்சி

- நோயாளியை படுக்கையில் படுக்கவைக்கவும்.

- கால்களை நேராக வைக்கவும்.
- கால்விரல்களை நேராக வைக்கவும்.
- ஒரு காலை 2 - 3 அங்குலம் அளவிற்கு மேலே உயர்த்தவும்.
- கால்களை அதே நிலையில் 8-10 வினாடிகள் வைக்கவும், பின் கால்களை கீழே இறக்கவும்.
- இதே போன்று 10 முறை இரண்டு கால்களுக்கும் செய்யவேண்டும்

3. ஐசோமெட்ரிக் உட்கார்ந்து காலினை நீட்டும் பயிற்சி

- நோயாளியை படுக்கையில் கால்களை கீழே தளர்த்திய படி அமரவைக்கவும்.
- ஒரு காலை படுக்கையின் அளவுக்கு மேலே உயர்த்தவும்.
- கால்களை அதே நிலையில் 8-10 வினாடிகள் வைக்கவும்.
- பின் கால்களை கீழே வைக்கவேண்டும்.
- இதே போன்று இருகால்களுக்கும் 10 முறை செய்யவேண்டும்.

4. ஐசோமெட்ரிக் ஸ்டேட்டிக் குவாட்ரிசெப்ஸ்

- கால்களை அகற்றி நிற்கவும்.
- கால் முட்டிகளை இறுக்க செய்யவும், பின் தளர்த்தவும்.
- இதே போன்று இருகால்களுக்கும் 10 முறை செய்யவேண்டும்.

ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**

Signature with Date

ANNEXURE – F

LIST OF EXPERTS

1. **Dr.Sanjay P. Anvekar, MS (ORTHO),**

   Consultantorthopedic Surgeon,

   Sri Gokulam Hospital,

   Salem

2. **Mrs.Pushpalatha, Ph.D (N),**

   HOD, Medical Surgical Department,

   Shanmuga College of Nursing,

   Salem.

3. **Mrs. Sheeja Msc (N),**

   Associate professor

   Shanmuga College of Nursing

   Salem.

4. **Mr.Shasikumar, M.Sc (N),**

   Associate Professor, Medical Surgical Department,

   Shri B M Patil College of Nursing,

   Bijapur.

5. **Mrs. Lakshmi Prabha, M.Sc (N),**

   Associate Professor, Medical Surgical Department,

   Vinayaka Mission College of Nursing,

6. **Mrs. Jisha, M.Sc (N),**

   Associate professor, Medical surgical department,

   Medical Trust College of nursing,

   Cochin, Kerala.

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**

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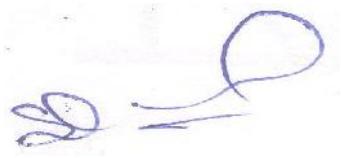
5/6/13

Signature with Date

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**



Signature with Date

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**

06/07/13

Signature with Date

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**

19/7/13

Signature with Date

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by **Ms.Geena George,** Final Year M.Sc Nursing student of Sri Gokulam College of Nursing, Salem (Affiliated to Tamil Nadu Dr.M.G.R. Medical University, Chennai) is validated and can proceed with this tool and content for the main study entitled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem".**

Signature with Date

ANNEXURE – G

CERTIFICATE OF EDITING

TO WHOM IT MAY CONCERN

Certified that the dissertation paper titled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem",** by **Ms. GEENA GEORGE,** has been checked for accuracy and correctness of English language usage, and that the language used in presenting the paper is lucid, unambiguous, free of grammatical / spelling errors and apt for the purpose.

Signature with Date

Department of English
Anbu Arts and Science College
Komarapalayam.

CERTIFICATE OF EDITING

TO WHOM IT MAY CONCERN:

Certified that the dissertation paper titled **"A Study to Evaluate the Effectiveness of Isometric Exercise on Pain among Patients with Osteoarthritis at selected Hospitals, Salem",** by **Ms. GEENA GEORGE,** has been checked for accuracy and correctness of Tamil language usage, and that the language used in presenting the paper is lucid, unambiguous, free of grammatical / spelling errors and apt for the purpose.

Signature:

Name and Designation: Dr. N. KRISHNAN Research Associate Professor

Date: 30-12-13

Dr. N. KRISHNAN, M.A.,Ph.D.
Research Co-ordinator (Humanities)
S. T. Hindu College
Nagercoil-629 002

ANNEXURE -H

PHOTOS

The investigator assessing the pain using Numerical Pain Intensity Scale

The investigator demonstrating isometric exercises

The investigator demonstrating isometric exercises

The investigator demonstrating isometric exercises